South Carolina DNR's Groundwater Monitoring Network

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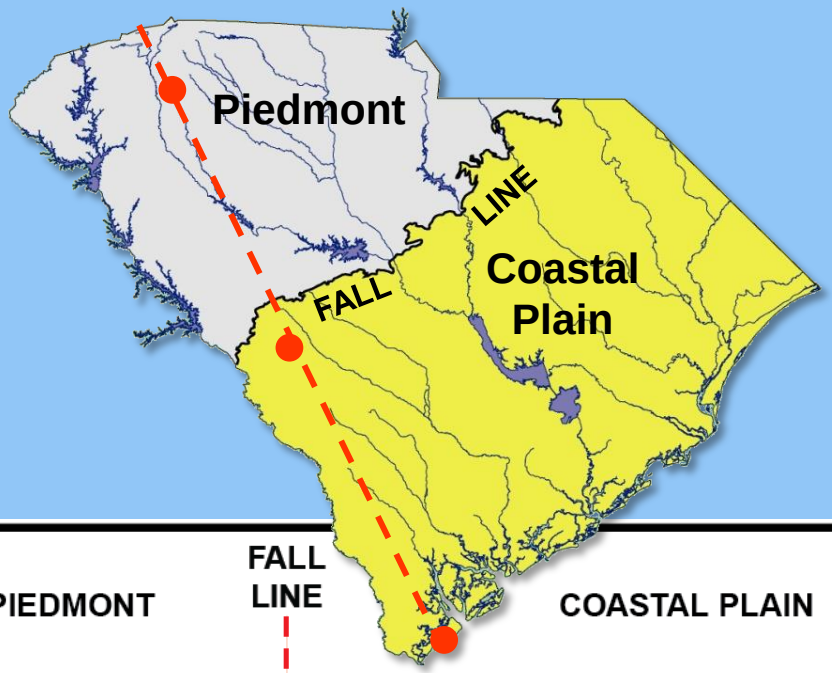
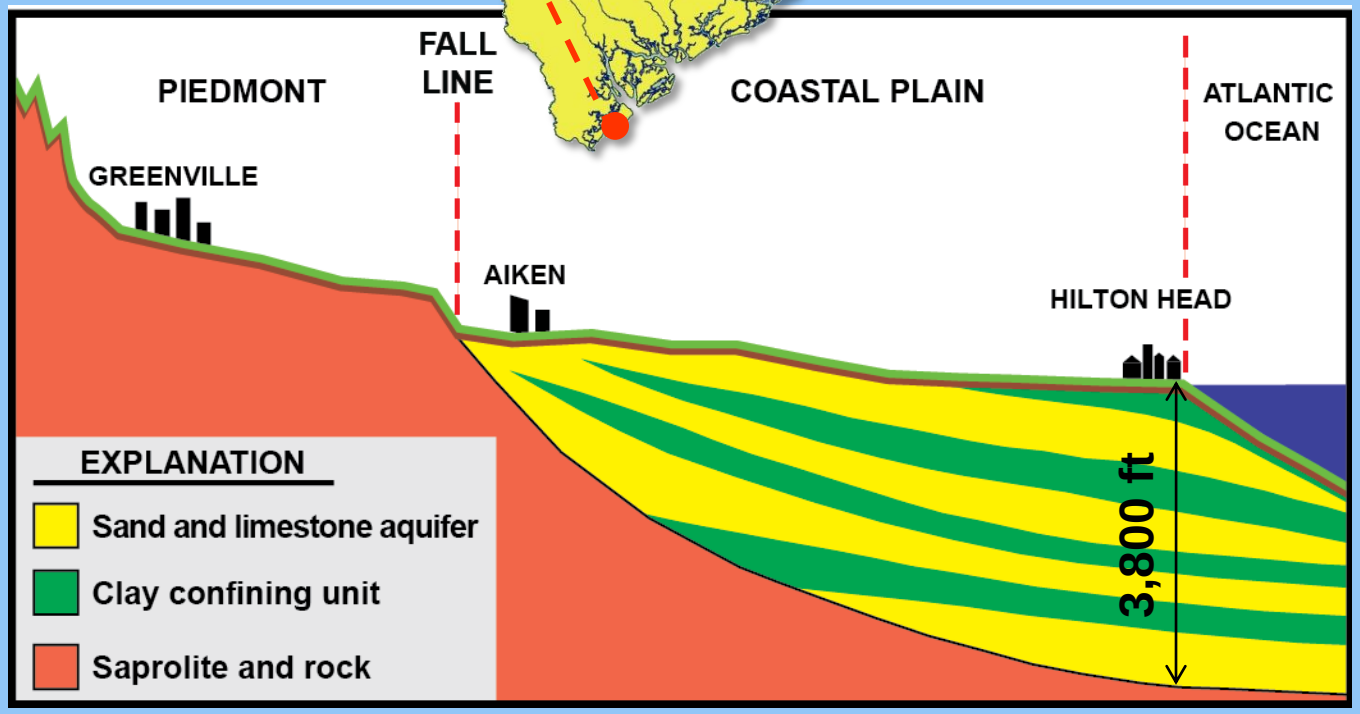
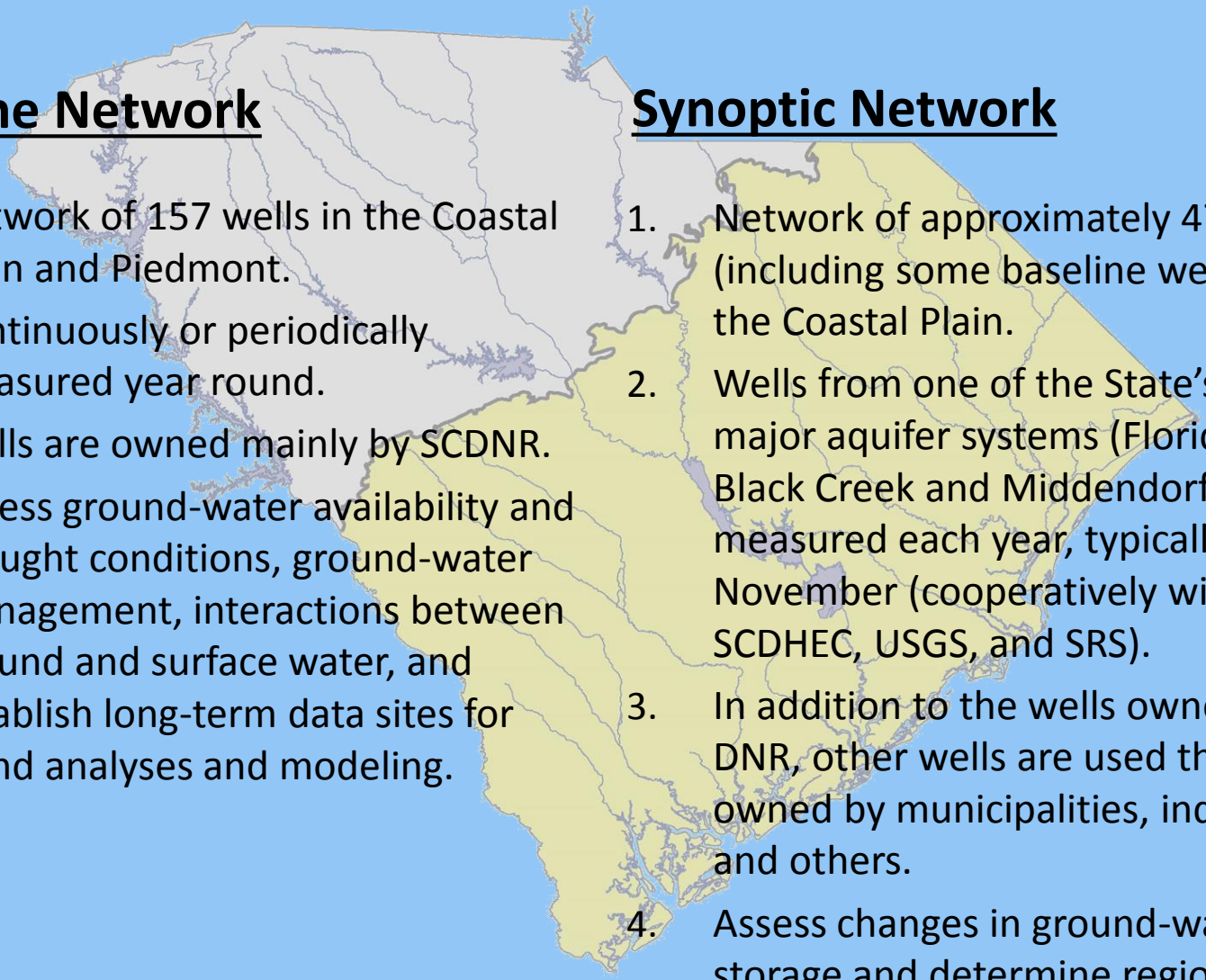
General Geology of SC





SCDNR Ground-Water Level Networks



Baseline Network

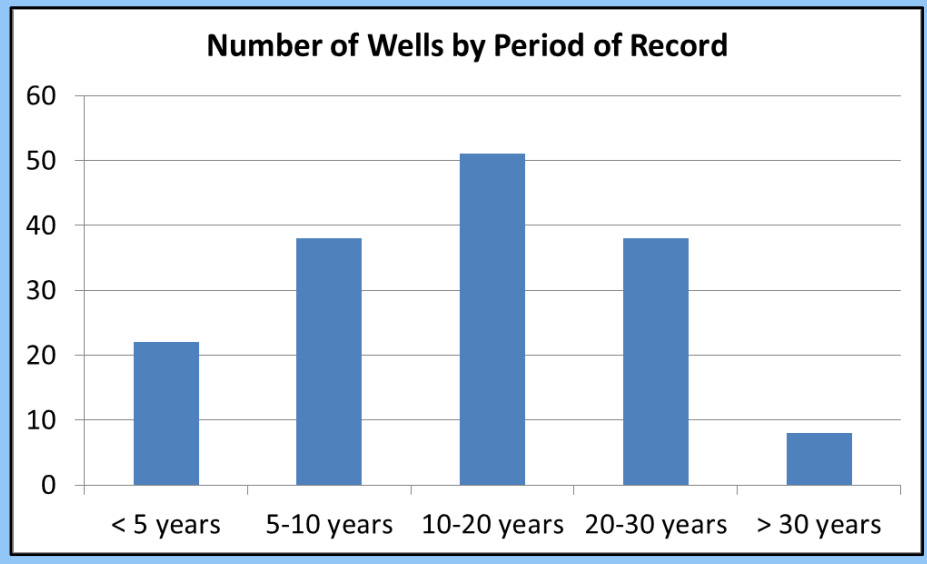
1. Network of 157 wells in the Coastal Plain and Piedmont.
2. Continuously or periodically measured year round.
3. Wells are owned mainly by SCDNR.
4. Assess ground-water availability and drought conditions, ground-water management, interactions between ground and surface water, and establish long-term data sites for trend analyses and modeling.

Synoptic Network

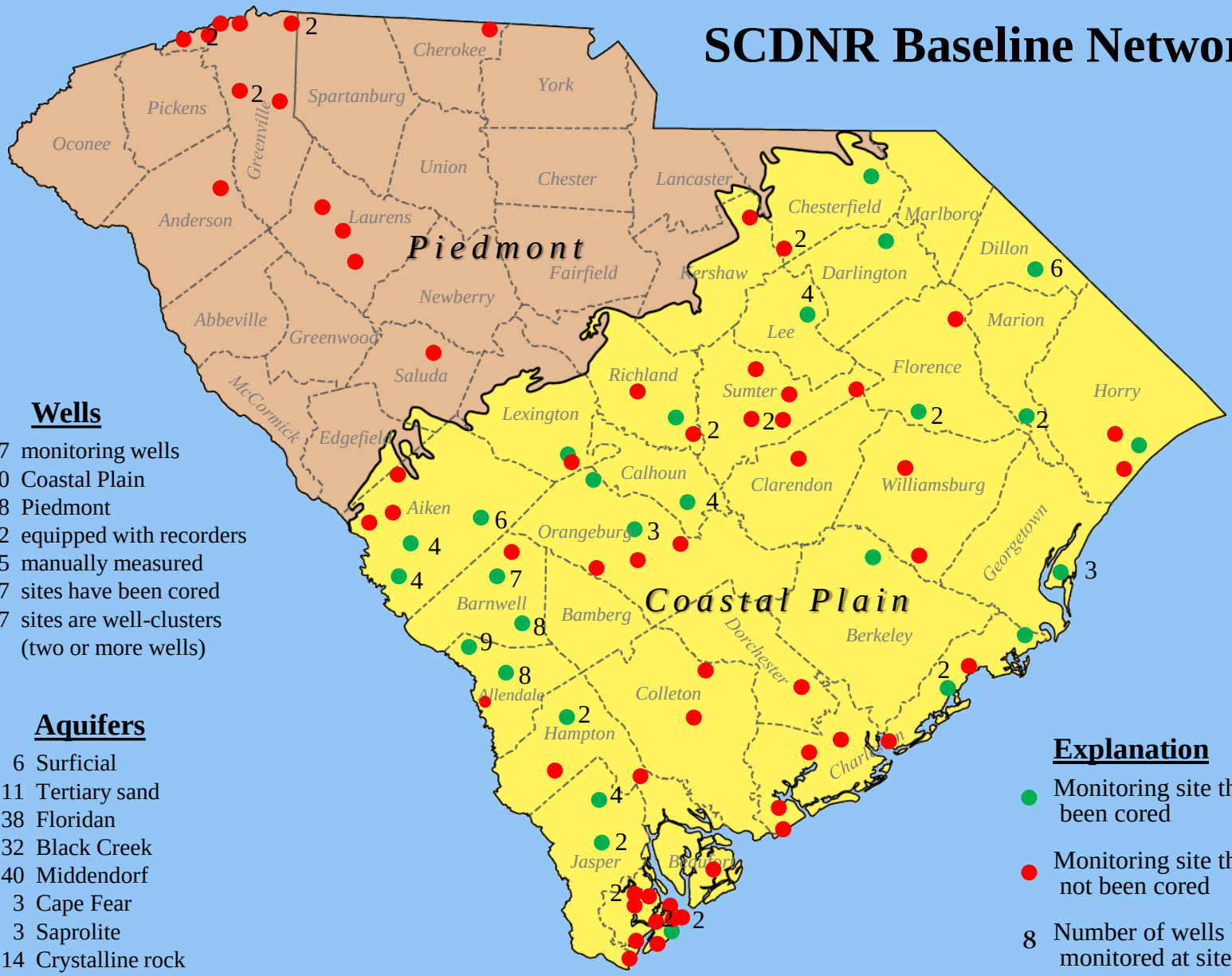
1. Network of approximately 475 wells (including some baseline wells) in the Coastal Plain.
2. Wells from one of the State's three major aquifer systems (Floridan, Black Creek and Middendorf) are measured each year, typically in November (cooperatively with the SCDHEC, USGS, and SRS).
3. In addition to the wells owned by DNR, other wells are used that are owned by municipalities, industries, and others.
4. Assess changes in ground-water storage and determine regional flow directions and hydraulic gradients of the major aquifer systems.

SCDNR Baseline Network

- 157 wells – most owned by SCDNR.
- 122 wells – Equipped with automatic data recorders (ADRs) which record hourly water levels.
- 35 wells – Periodic measurements made every 2 months.
- Periods of Record:
  - range from several months to over 50 years.
  - 10-20 years is typical.



SCDNR Baseline Network



Wells

157 monitoring wells
140 Coastal Plain
18 Piedmont
122 equipped with recorders
35 manually measured
27 sites have been cored
27 sites are well-clusters (two or more wells)

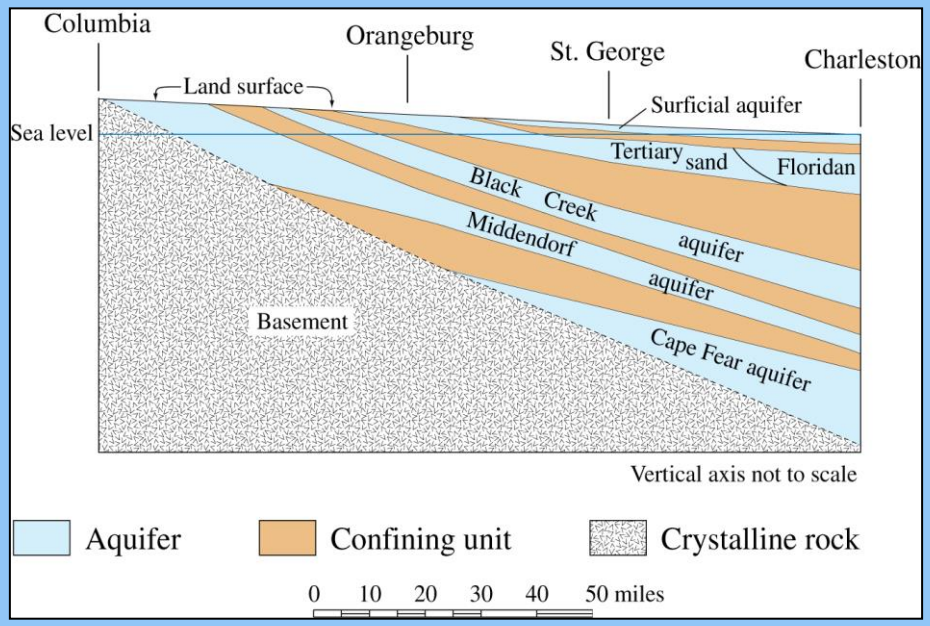
Aquifers

6 Surficial
11 Tertiary sand
38 Floridan
32 Black Creek
40 Middendorf
3 Cape Fear
3 Saprolite
14 Crystalline rock

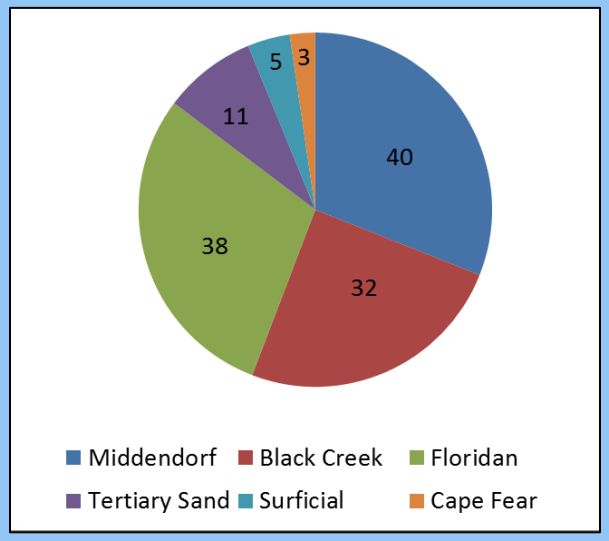
Explanation

- Monitoring site that has been cored
- Monitoring site that has not been cored
- 8 Number of wells being monitored at site

Coastal Plain Aquifer System



Principal Coastal Plain Aquifers



Aquifer distribution of monitoring wells

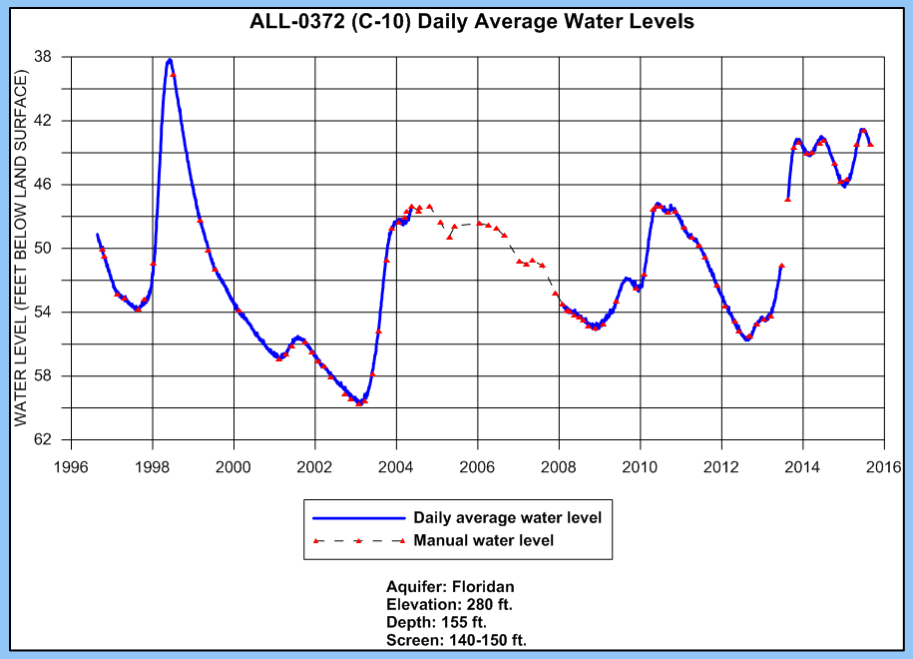
Updip	Downdip	Savannah River Site	Downdip from Savannah River Site
	Surficial aquifer		Surficial aquifer
			Upper Floridan confining unit
Tertiary sand aquifer (upper part)	Floridan aquifer system	Upper Three Runs aquifer	Upper Floridan aquifer
			Middle Floridan confining unit
			Middle Floridan aquifer
		Steed Pond aquifer: Gordon confining unit	Gordon confining unit
Tertiary sand aquifer (lower part)		Gordon aquifer	Gordon aquifer
unnamed confining unit		Crouch Branch confining unit	Crouch Branch confining unit
Black Creek aquifer		Crouch Branch aquifer	Crouch Branch aquifer
unnamed confining unit		McQueen Branch confining unit	McQueen Branch confining unit
Middendorf aquifer		McQueen Branch aquifer	McQueen Branch aquifer
			Charleston confining unit
			Charleston aquifer
unnamed confining unit		unnamed confining unit	Gramling confining unit
Cape Fear aquifer			Gramling aquifer
(Aucott and others, 1987)		(Aadland and others, 1995)	(Gellici and Lautier, 2010)

Comparison of hydrostratigraphic nomenclature system in SC

(Moving towards Gellici and Lautier nomenclature)

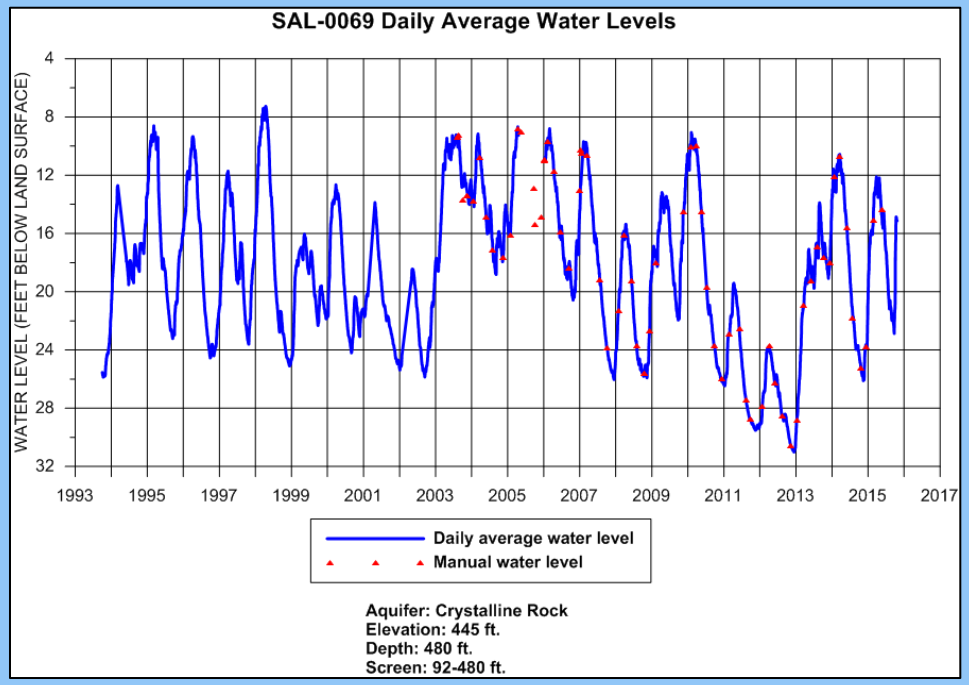
Methods

- Field visits are taken every 2 months:
  - Manual measurements are recorded.
  - ADRs (predominantly of the pressure transducer variety) are downloaded.
  - ADRs are calibrated, fixed or replaced as needed.
- Manual and downloaded hourly data are checked for quality assurance and quality control
- Data is entered into an ORACLE database that uses ACCESS as an interface for data entry.
- Daily average water levels are computed from hourly data and converted to depths below land surface.



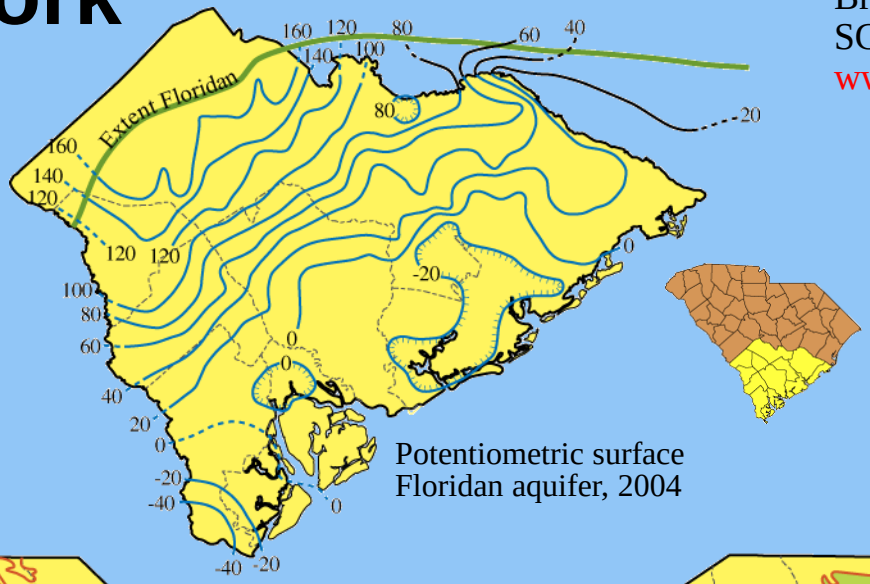
Telemetry Sites

- Installed two real-time monitoring systems within last 12 months
- Purpose: drought monitoring/general assessment of state's hydrologic conditions
- Plans to add additional 8-10 sites over next 12 months



Synoptic Network

Maps by:
Brenda Hockensmith
SCDNR Reports 46, 47, & 48
www.dnr.sc.gov

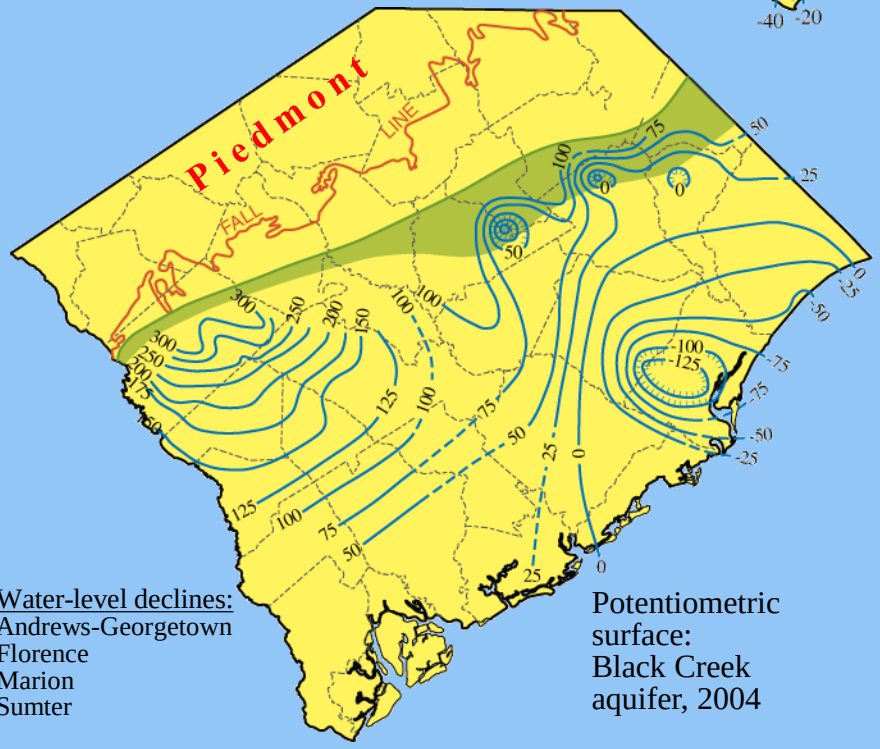


EXPLANATION

100 — Potentiometric contour of the aquifer in feet relative to sea level. Dashed where approximate.

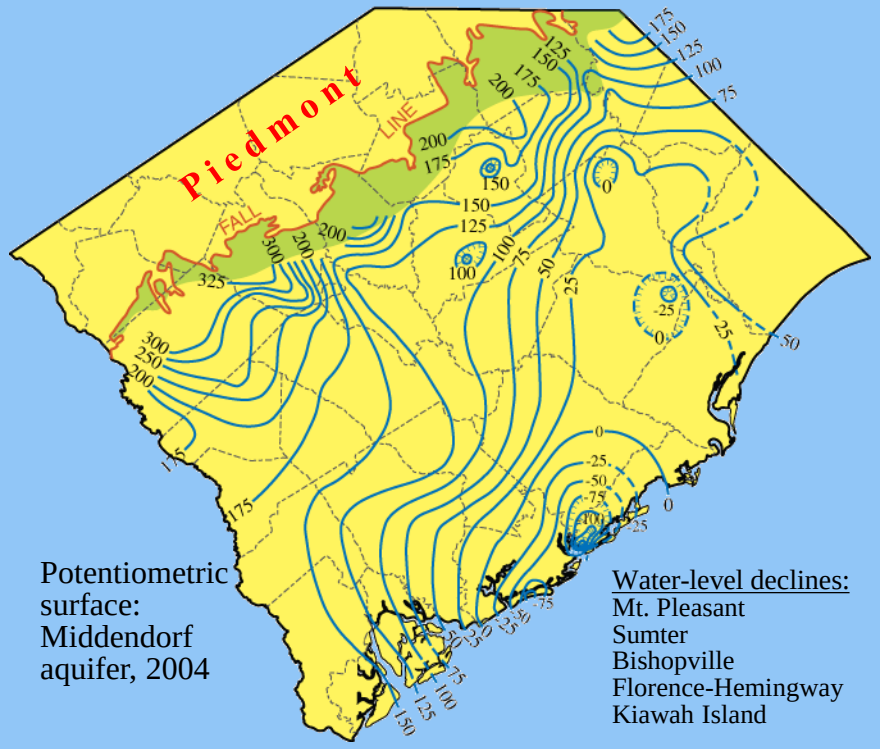
Outcrop area of aquifer

Potentiometric surface
Floridan aquifer, 2004



Water-level declines:
Andrews-Georgetown
Florence
Marion
Sumter

Potentiometric surface:
Black Creek aquifer, 2004



Potentiometric surface:
Middendorf aquifer, 2004

Water-level declines:
Mt. Pleasant
Sumter
Bishopville
Florence-Hemingway
Kiawah Island

Publications/Reports:

http://www.dnr.sc.gov/water/hydro/publications.html

Data available for download at:

http://www.dnr.sc.gov/water/hydro/groundwater/index.html

Contact Info:

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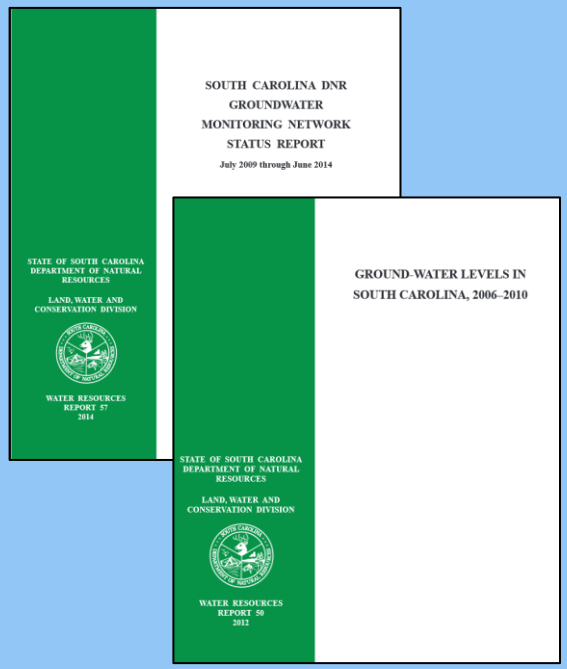
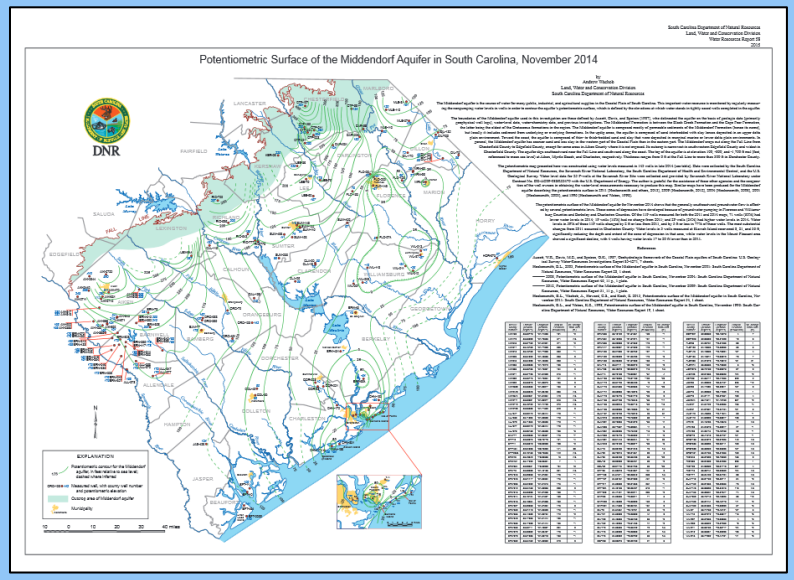




NGWMN Site Selection and Classification

- ***Surveillance wells:***
  - Synoptic Network (wells measured every 3 years for potentiometric mapping)
  - Approximately 375 wells (excluding baseline wells)
- ***Trend wells:***
  - Baseline Network: ADR wells with 5 or more years of record
  - Approximately 100 wells
- ***Backbone wells:***
  - Baseline Network: ADR wells with extended periods of record
  - Approximately 40-50 wells

Data System:

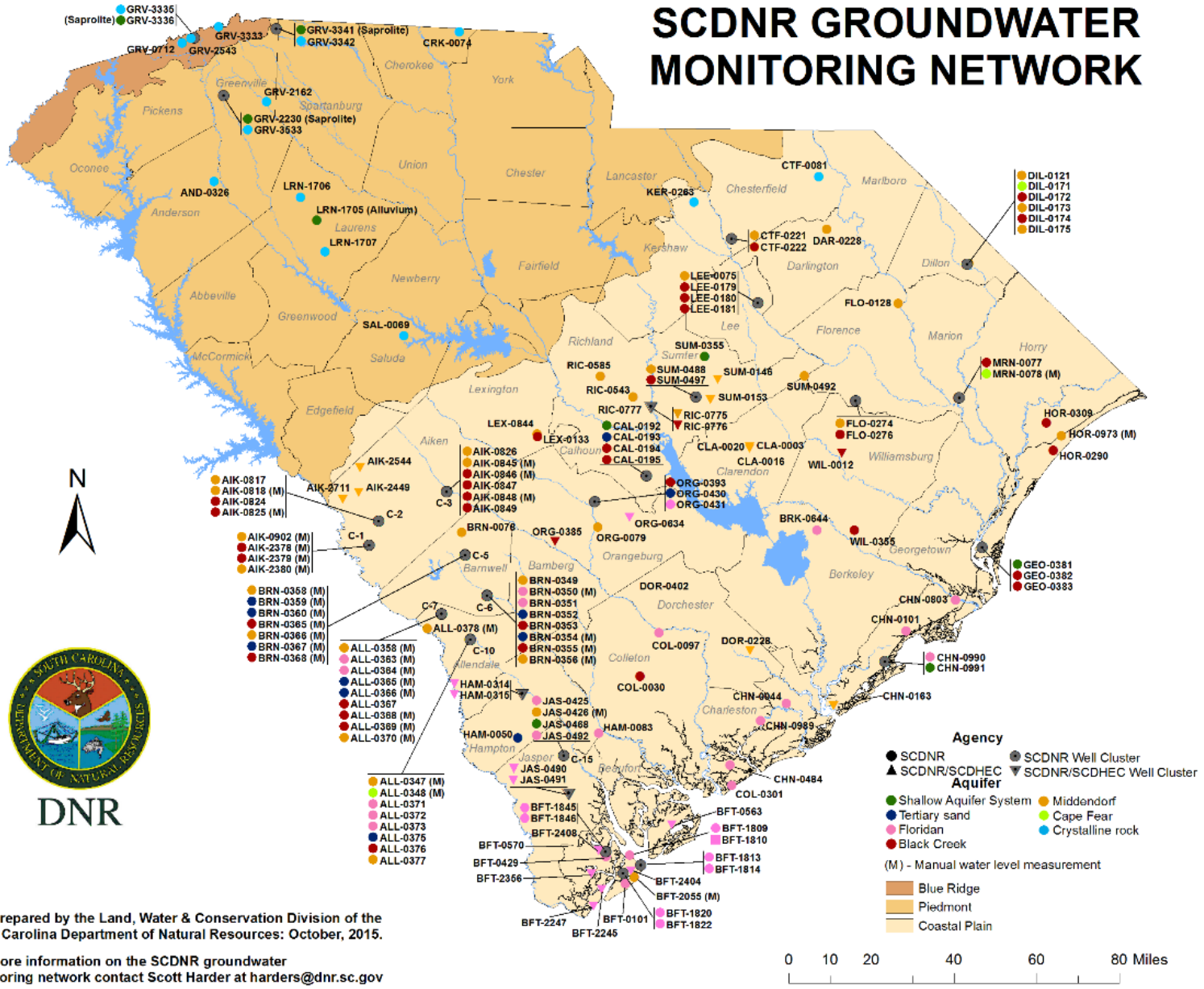
- Data permanently stored in SCDNR Oracle database
- New Sequel Server will be set up to periodically mirror the Oracle database
- New Sequel Server will be set up for Web Services
  - IT support will be hired after the first of the year.

Issues:

1. Data for Surveillance wells are currently not in database format
   - All records will need to be located and compiled
2. Metadata, such as location accuracy, method of measurement, etc is incomplete and will require regathering of some data.

Questions?

SCDNR GROUNDWATER MONITORING NETWORK

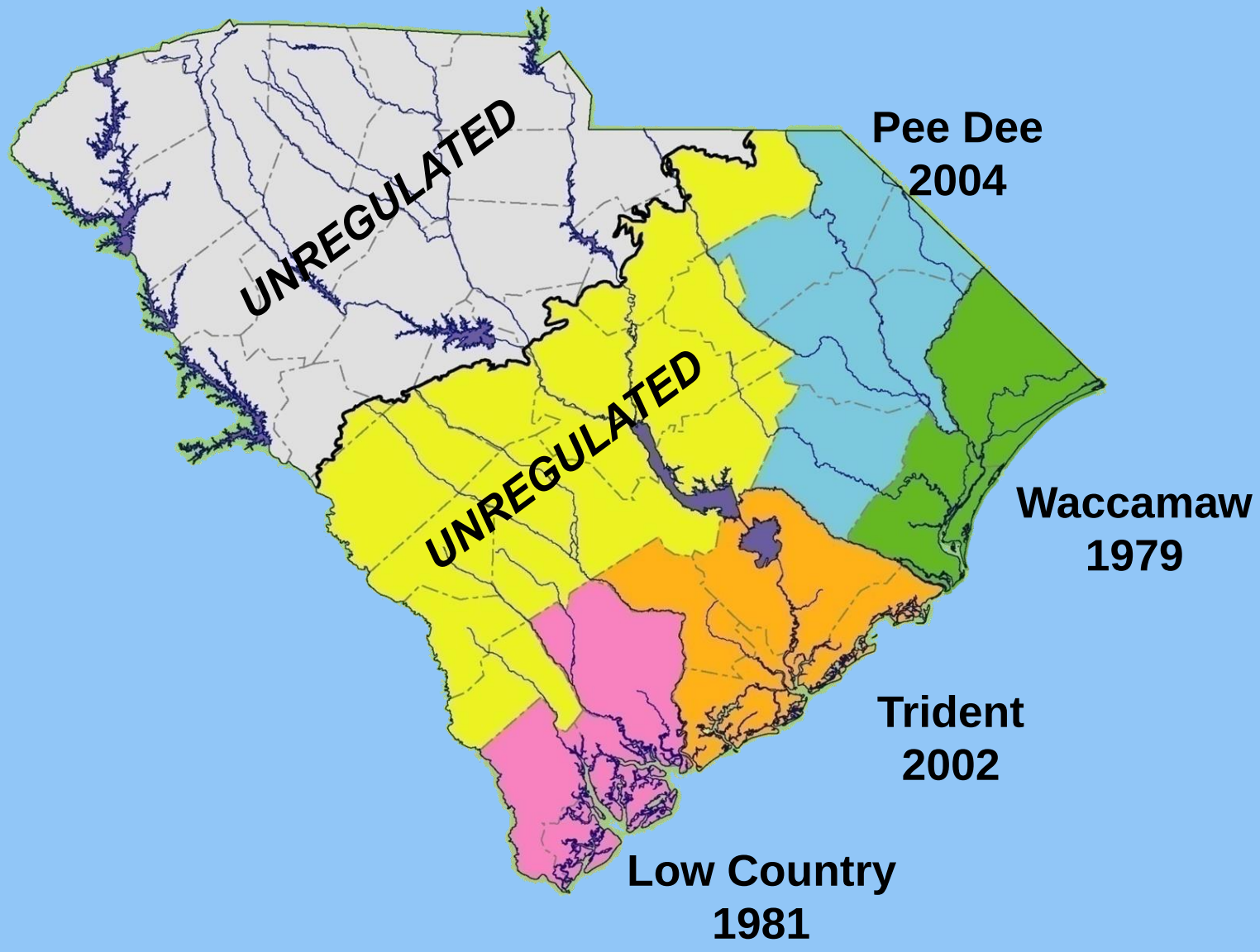


DNR

Map prepared by the Land, Water & Conservation Division of the South Carolina Department of Natural Resources: October, 2015.

For more information on the SCDNR groundwater monitoring network contact Scott Harder at harders@dnr.sc.gov

Areas where groundwater withdrawals are regulated



Major cones of depression in South Carolina